

Appeals from decisions of the Eastern States Office, Bureau of Land Management, rejecting oil and gas lease offers. ES 35175. 2/

Affirmed.

1. Oil and Gas Leases: Known Geologic Structure

A determination by BLM that lands are within a known geologic structure of a producing oil or gas field, which determination is based in part on aeromagnetic data, will not be disturbed in the absence of a showing of error by a preponderance of the evidence.

APPEARANCES: Leon F. Scully, Jr., Esq., West New York, New Jersey, for appellants; Mary Katherine Ishee, Esq., Office of the Solicitor, Washington, D.C., for the Bureau of Land Management.

OPINION BY ADMINISTRATIVE JUDGE ARNESS

Eileen Scully, Leon F. Scully, Jr., and Excelsior Exploration Company have appealed from decisions of the Eastern States Office, Bureau of Land Management (BLM), rejecting the noncompetitive oil and gas lease offers filed by each. Lands sought by appellants were determined by BLM to be within a known geologic structure (KGS) 3/ of a producing oil or gas field

1/ Appeals docketed as IBLA 86-1619 through 1622, 87-41, 87-88, and 87-90 have been consolidated for review because of the similarities of issues involved.

2/ The docket numbers set forth in note 1 identify appeals from rejection of offers ES 35175, ES 33044, ES 33042, ES 33043, ES 33763, and ES 34475 (partial), respectively. Docket number IBLA 87-90 identifies an appeal from a BLM decision increasing the rent on lease ES 26321 per 43 CFR 3103.2-2(d) (1986).

3/ Regulation 43 CFR 3100.0-5(1) (1987) defines a KGS as "technically the trap in which an accumulation of oil or gas has been discovered by drilling and determined to be productive." Upon passage of the Federal Onshore Oil and Gas Leasing Reform Act of 1987, P.L. 100-203, 101 Stat. 1330-259, this concept was deleted from 30 U.S.C. § 226 (1982). Oil and gas lease applications and offers pending on Dec. 22, 1987, were, however, to be processed and leases issued under the provisions of the Act of Feb. 25, 1920, as in effect before its amendment by P.L. 100-203.

and, consequently, to be unavailable for noncompetitive leasing. In support of its decision, BLM cited 43 CFR 3110.3(a), which states:

If, prior to the time a noncompetitive lease is issued, all or part of the lands in the offer are found to be within a known geological structure of a producing oil or gas field \* \* \*, the offer shall be rejected in whole or in part as to such lands, as appropriate.

By memorandum of January 17, 1986, the Milwaukee District Manager, BLM, informed the Eastern States Director that the Newaygo-Mecosta KGS was effective as of December 25, 1985. Lands within this KGS totalled 363,260 acres, and appellants' offers described lands therein. BLM's memorandum stated that "[a] review of deep tests in Lake, Mason, Osceola, Oceana, Newaygo, Mecosta, Montcalm, Kent, and Muskegon Counties in Michigan has revealed that Prairie du Chien production is directly related to the geologic structure causing a very large negative magnetic anomaly." Review of this area had been occasioned, BLM explained, by recent over-the-counter applications and successful tests of the Prairie du Chien formation.

The BLM KGS report states that the Newaygo-Mecosta KGS includes lands within the Goodwell-Norwich and Barton KGS's, but that it is not an extension or combination of these previous KGS's. Instead, the report states, the Newaygo-Mecosta KGS is based on a new producing structure defined by new drilling to the Prairie du Chien and lower formations.

Appellants contend that BLM has erred in designating the Newaygo-Mecosta KGS because it is "apparent to even the untutored eye \* \* \* that all of the discovery and development wells in the [Prairie du Chien] underlay or were adjacent to fields already producing from shallower zones" (Statement of Reasons (SOR), July 6, 1987, at 5). In support, appellants point out that of the five producing wells in the Prairie du Chien at the time of BLM's action, 4/ four were within the pre-existing (1966) Goodwell-Norwich KGS whose production was obtained from shallower, Devonian formations.

On page 2 of their SOR, appellants quote with approval from page 61 of an April 1987 article in "World Oil" describing the area and formations at issue:

In the early 1980s many deep tests into or through the St. Peter sandstone [a.k.a. Prairie du Chien formation] were drilled on a rather random basis throughout the central Michigan basin. Not until drilling was confined to penetration of known, shallower (Devonian) fields, however, did any measure of success become achievable. Based on the drilling success record of the last three years, productive reservoir intervals can be found by using high quality seismic data and locating structurally high

4/ Appellants state that as of Feb. 13, 1987, 17 of 20 separate Prairie du Chien fields were deeper discoveries under or adjacent to pre-existing fields producing at a lesser depth (SOR at 2-3).

anomalies beneath or adjacent to known producing Devonian fields. This paradigm suggests that the structures that provide traps for shallow fields in the Michigan basin generally also have some expression at depth and were in place in time to trap hydrocarbons in many formations throughout the geologic column.

See SOR, Exh. A.

In response, BLM states:

[I]n late 1985, the "Shallow Devonian Structure" exploration concept was vaguely supported by existing data. However, the presence of several major unconformities between the Devonian and the Prairie du Chien [PdC] formation cast serious doubt on the likelihood that the structures continued unabated to any great depth. The exact mechanism controlling the deeper production was nebulous and many individuals were searching for a better exploration model. All known efforts to explain the PdC production were being developed utilizing the traditional structural model for the Michigan Basin, (i.e., a bowl-shaped depression filled with sediments, and underlain by a basement with a featureless surface).

However, based upon a geologic analysis of all available data in the Newaygo-Mecosta area, the Bureau concluded that the traditional structural model for the Michigan Basin was wrong. Rather, the Basin is two-tiered (i.e., a deeper section deformed by tectonic activity associated with the Mid-Michigan Rift is overlain by relatively undisturbed sediments which have masked the deeper section). Therefore, it is the Bureau's interpretation that the Prairie du Chien production and the shallower production were structurally unrelated. Further, although the exact controlling mechanism for each Prairie du Chien discovery is unknown, a corollary to the two-tier model was that any major structural features associated with the production could be delineated using well-control and aeromagnetic data, which was available to the Bureau. [Emphasis added.]

(BLM's Summarized Response to SOR, Jan. 29, 1988, at 2).

As noted in the final sentence quoted above, BLM used well data and aeromagnetic data to delineate the structure associated with production from the Prairie du Chien. Appellants contend that BLM misinterpreted the aeromagnetic data, specifically, a negative magnetic anomaly, 5/ revealed by a

5/ In Wilfred Plomis, 104 IBLA n.4 (1988), we quoted BLM's definition of a magnetic anomaly in these terms:

"Aeromagnetic survey data are measurements of the distortion of the earth's magnetic field generated by its interactions with rock units of the earth's crust. Correction factors must be applied to the raw survey data to remove background magnetic trends (regional magnetic field, etc.) and other noise. The remaining pattern of magnetic highs and lows are magnetic anomalies."

survey of the Southern Peninsula of Michigan. BLM erred, appellants state, by concluding that the anomaly was "probably caused by a basement high." 6/ The anomaly appellants refer to appears in a magnetic anomaly map published in 1971 by the Michigan Geological Society. 7/

In support of their argument that BLM misinterpreted the anomaly as a basement high, appellants rely on the research of Dr. Richard L. Kellogg, whose 1971 doctoral thesis interpreted the magnetic anomaly map. Appellants state that Dr. Kellogg and others are of the mind that "it is more probable that the anomaly was caused by 'basement lithology' and not 'basement topography.' That the difference in magnetics was not attributable to the structure of the rocks but by what was in them, elements having a greater or lesser susceptibility to magnetism" (SOR at 28 (emphasis added)).

In response, BLM acknowledges the contrary view taken by Dr. Kellogg, but explains its departure in these terms:

Dr. Kellogg's report [Hinze, Kellogg, and Merritt, "Report of Investigation 14" (1971)] was written prior to the opening of the Prairie du Chien play and was heavily dependent upon the assumption that the surface of the Michigan Basin's basement is essentially featureless and hence, aeromagnetic data would only reflect lithologic changes in the basement. However, the Prairie du Chien wells drilled in Newaygo County led the Bureau to the conclusion that this was wrong (i.e., that rifting associated with the basement extended into the lower Paleozoic) and consequently, aeromagnetic data would evidence any lower Paleozoic structures associated with the basement. Consequently, aeromagnetic data became part (not all) of the "all available geologic data" which needed to be examined in the geologic evaluation necessary for a KGS determination.

(BLM Response to SOR, Jan. 29, 1988, at 28). Other sources of data examined by BLM included well data, 8/ gravitational data, structure maps, isopachs, and previous analyses and models for the Michigan Basin (BLM's Summarized Response to SOR, supra at 3).

6/ The quoted language appears on page 1 of BLM's KGS report, as revised on May 2, 1986.

7/ BLM's map #3 bears the following legend: "Magnetic data after Mich. [Department of Natural Resources] Report of Inv. #14 plate 2." Plate 2 is designated "Total Magnetic Intensity Anomaly Map of the Southern Peninsula of Michigan." Map #3 and Report of Investigation #14 are part of the KGS supporting documentation.

8/ BLM states in its KGS report that its study was based on data from 180 wells, 30 of which were deep enough to encounter the Prairie du Chien formation. Of these 30, BLM's Map #3 reveals that 6 wells are within the KGS area, and 5 of these are producing gas. The report further states that production data and exploration results correlate extremely well with the magnetic anomaly map.

It is plain from the above arguments that BLM and appellants disagree both as to the structural model involved, *i.e.*, whether production from the Prairie du Chien is structurally related to shallower production, and as to the significance of the magnetic anomaly in question. Though these issues may appear discrete, they are, in fact, related because BLM's interpretation of the anomaly, based upon well data, contributed to its conclusion that Prairie du Chien production was structurally unrelated to shallower production.

The case law is clear that an appellant challenging a Departmental interpretation that land is within a KGS of a producing oil or gas field has the burden of showing that the determination is in error by a preponderance of the evidence. Bender v. Clark, 744 F.2d 1424 (10th Cir. 1984). Proof by a preponderance of the evidence is the traditional standard of proof required in a civil or administrative proceeding. Thunderbird Oil Corp., 91 IBLA 195 (1986), affirmed sub nom. Planet Corp. v. Hodel, CV No. 86-679 HB (D.N.M. May 6, 1987).

[1] Upon reviewing the KGS report, the arguments of the parties, and supporting documentation in the record, we hold that appellants have failed to show that BLM's KGS determination is in error by a preponderance of the evidence. Appellants rely heavily on the view of Dr. Kellogg that a magnetic anomaly is likely to represent lithologic variation in basement rock, rather than topography or structure there, and hence that the basement is featureless. This view, however, was not supported by wells in the Prairie du Chien formation, BLM found, because these wells indicated that the lower Paleozoic sediments and the basement were rifted. Despite the importance of this finding to the interpretation of the anomaly at issue, appellants fail to address this finding.

BLM's position that a magnetic anomaly may reflect basement structure or topography is supported by the record. A similar conclusion attributed to L.L. Nettleton <sup>9/</sup> appears in the supporting documents of the KGS report:

With adequate magnetic surveys it is often possible to determine basement depths in sufficient detail for local structure on the basement surface to be reliably delineated. In addition to individual determinations of depth to the magnetic source this may involve modeling of an individual basement feature and determination of its major geometric parameters. If the geological deformation which caused the local basement feature, either originally or by rejuvenation, is later than the time of deposition of the overlying sediments, the basement disturbance may have caused deformation of those sediments which could be a major factor in oil accumulation.

BLM's use of aeromagnetic data and well data permitted it to construct a structural map of the Prairie du Chien formation. This map caused BLM to conclude, contrary to appellants' view, that production from the shallower

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<sup>9/</sup> L.L. Nettleton, Gravity and Magnetism in Oil Prospecting 395 (1976).

Devonian formations was structurally unrelated to Prairie du Chien production. The presence of several major unconformities between those two regions provided further support for BLM's conclusion. No mention of unconformities or their significance is present in appellants' pleadings.

In Champlin Petroleum Co., 86 IBLA 37, 40 (1985), the Board stated that "[w]here the conclusions drawn from geological data are subject to different interpretations, the Secretary is entitled to rely upon the reasoned opinion of his technical expert in the field." We find no reason to depart from this principle in the present case.

In the remainder of their SOR, appellants charge that BLM failed to consider certain well data and failed to observe the terms of its Manual. BLM has responded by pointing out that some well data was unavailable to it at the time of the KGS determination, but that upon its subsequent examination, no change in the KGS is merited. The remaining well data did not depict relevant formations, BLM states. No reply to BLM's response has been forthcoming from appellants. Our review of the record reveals that appellants have identified no relevant data that BLM failed to consider in its KGS determination. The Manual violations charged by appellants (failure to post a KGS map; failure to name the KGS after a producing field, inter alia) would not, if established, demonstrate error in the decision on appeal. These charges, and others not expressly addressed here, have been considered by this Board and found to provide no basis for a change in BLM's KGS determination.

Therefore, pursuant to the authority delegated to the Board of Land Appeals by the Secretary of the Interior, 43 CFR 4.1, the decisions of the Eastern States Office are affirmed.

Franklin D. Arness  
Administrative Judge

I concur:

Bruce R. Harris  
Administrative Judge